DETAILED ACTION

Response to Amendment

1. Applicant's amendments of 03/30/11 have been entered. Claims 1-9 are currently under examination on the merits. The previous 112 rejections are withdrawn due to applicant's amendments.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 4-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caroselli (U.S. 3,625,809) in view of Marzocchi (U.S. 3,631,667) in view of Davis (U.S. 2,448,782).

6. Regarding claim 1, Caroselli discloses a composite with a first high modulus component (i.e. relatively high tensile strength glass, 22, Fig. 1, 2, 3) and a second low modulus component (i.e. elastic component, 20, Fig. 1, 2, 3). When an appropriate amount of force is applied to the composite strand the two components form a helical arrangement with both components wrapping around each other as instantly claimed. The variation in the load on the composite determines the radial position and the helix diameter of both components with the high modulus component's helix decreasing as more stress is applied and the low modulus component's helix increasing as more stress is applied. Caroselli does not explicitly disclose that the diameter of the high tensile component is smaller than the other component but it does disclose that a very small diameter glass can be used for the high tensile component (C2, L1-65). Marzocchi which is drawn to a similar invention shows that the high strength glass component can be wrapped around a much larger diameter low strength component (See Fig. 4, Fig. 11, C6, L40-60). While the exact size difference is not disclosed, one having ordinary skill in the art would have found it obvious to alter the diameter of the core elastic component relative to the wrapping high strength component to control the amount of stress taken up by the core component before the high strength component begins to straighten. As in Fig 1-3 (C3, L15-25) of Caroselli, the high strength component does not straighten and bear the load until the elastic component has

stretched sufficiently. Therefore by utilizing a thicker core elastic component the amount of stress needed to stretch the core component will increase and the amount of stress the composite structure can absorb will increase correspondingly (allowing for more stress absorption before the high tensile wrapping component is put under strain and has to straighten to bear the load). Hence it would have been obvious to have made the core elastic component thicker to allow more strain to be taken up by the elastic component before the outer wrapping component is required to take the additional strain. With a thicker elastic component, upon stretching, the high strength inelastic wrapper will straighten and force the elastic component into a greater helical diameter and thereby give the composite a greater overall diameter (i.e. to read on the negative effective Poisson's ratio as instantly claimed).

7. Caroselli does not disclose that the high strength component is a metal; however, Davis, which is also directed towards composite strands of a high strength material wrapped around a low strength material, discloses that other materials can be used as alternatives to glass for the high strength material, including metal wires (C1, L25-50, C3, L25-35, Fig. 3). Hence it would have been obvious to have used the different high strength materials, including the metal wire, of Davis, in place of or in addition to the outer glass fibers of Caroselli, in order to alter the strength of the high strength component of the composite material, thereby altering the overall strength property of the composite. In addition to the different strength properties of the materials as set forth in Davis, one having ordinary skill would also find it obvious that metal wires disclosed in Davis would have certain advantageous properties in certain circumstances which may be lacking in glass materials (e.g. ductility).

8. With respect to claim 4, the glass fiber is wrapped around the core fiber roving (Fig. 4, Marzocchi). With respect to claim 5, the first component and the second component are in the shape of continuous fibers wrapped around each other (Fig. 4, Marzocchi, Fig. 1-3, Caroselli) and the glass component is a higher modulus than the elastic component. With respect to claim 6, the elastic component is also a core component when the fiber is in its unstretched condition (i.e. the elastic component straight and the inelastic component wrapping around as in Fig. 1 of Caroselli and Fig. 4 of Marzocchi). With respect to claim 9, elastomeric materials are disclosed for the thick core material of Caroselli, (C2, L70-75)

9. Claims 2 and 3, 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caroselli (U.S. 3,625,809) in view of Marzocchi (U.S. 3,631,667) in view of Davis (U.S. 2,448,782) as applied to claim 1 above, and further in view of Maag et al. (U.S. 4,028,874)

10. Regarding claims 2 and 3, modified Caroselli discloses all of the limitations as set forth above. The thickness of the core elastic component of modified Caroselli would also obvious be increase as explained above in order to increase the elastic load bearing of the composite before the inelastic component takes over. Modified Caroselli does not disclose the exact relative diameters and cross sectional surface areas of the components; however, Maag et al., which is also directed towards a roving wrapped with a fiber (Fig. 1) discloses that the core roving can be made many time larger than the wrapping fiber (C5-20, the core having a total size of 30,000 dtex and the wrapping fiber having a size of less than 15 dtex). The ranges of relative sizes disclosed in Maag include the claimed relative diameters and cross sectional areas.

11. Given that it would have been obvious to have altered the relative thicknesses of the core and wrapping components as explained in the rejection of claim 1, it would have been further obvious to have used the entire range of relative sizes disclosed in the related art of Maag in the process of optimizing the amount of load taken up by the elastic core before the inelastic wrapping is forced to straighten out. Using the large difference in size between the two components would allow a substantial amount of force to be taken up by the elastic component before the inelastic component is straightened out.

12. With respect to claims 7 and 8, the increase in load on the composite causes parts of the elastic component to move radially inward during the first stage (i.e. Fig. 2 of Caroselli, when the two components are both helically arranged) and then when the load is further increased parts of the second component moves outwards as the high modulus component fully straightens (i.e. Fig. 3 of Caroselli).

Response to Arguments

13. Applicant's arguments of 03/30/11 are considered moot in light of the new grounds of rejection which were necessitated by applicant's amendments.

14. Applicant argues that Marzocchi teaches away from using steel for the outer small diameter material merely because it teaches using it as a substitute for the core material. This is not so. Teaching one material for one component of a final product does not impliedly teach away from using that material for another component of the final product. In fact Marzocchi, while specifically disclosing using steel for the core component, also discloses that steel can be used in tertiary combination in the composite to allow the incorporation of a "wide range of

desirable properties." Hence Marzocchi actually teaches generally using steel in other ways than the core.

15. Applicant also argues the product has novel uses however this argument is moot since those uses are not instantly claimed.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL B. NELSON whose telephone number is (571) 270-3877. The examiner can normally be reached on Monday through Friday 6AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/SOPHIE HON/
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